DOCUMENT RESUME

ED 136 267 CS 203 240

AUTHOR Lewis, J. Richard
TITLE Nonsimulation Academic Games and the Teaching of Language Usage Skills.
PUB DATE [75]
NOTE 18p.

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS Capitalization (Alphabetic); *Educational Games; Educational Research; *English Instruction; Grade 8; Junior High Schools; *Language Skills; Punctuation; Secondary Education; *Teaching Techniques; *Writing Skills
IDENTIFIERS Teams Games Tournament

ABSTRACT

The effectiveness of certain nonsimulation academic games in a gaming system called Teams-Games-Tournaments (TGT) was investigated as a method of teaching the skills of capitalization and punctuation. A sample of 138 eighth-grade students participated in an 18-day experiment comparing three teaching methods: gaming, in which students were taught exclusively through gaming strategies using the TGT technique; combination, in which students were taught through a combination of conventional methods and gaming strategies using TGT; and control, in which students were taught through conventional methods. A posttreatment assessment measured capitalization and punctuation skills. Results indicated no significant differences among teaching methods in their effects on the learning of these skills. This was interpreted as indicating that TGT is a viable alternative to traditional techniques. (Author/AA)

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NONSIMULATION ACADEMIC GAMES AND THE TEACHING OF LANGUAGE USAGE SKILLS

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PROBLEM

Educators constantly seek instructional techniques and materials that can be used to help students achieve scholastic success. Among the many techniques and materials that have been used with differing degrees of success by teachers in various curriculum areas are academic games. While increasingly common in classroom use, few of these games have been systematically studied for their effectiveness as teaching devices. Even less often have the conditions and the context within which academic games are played been scrutinized. To validate the inclusion of academic games in the curriculum, information should be available to teachers regarding the effectiveness of games as a method of instruction, as well as the various contexts and situations within which they may be used.

The literature on gaming usually divides games into two categories, simulation games and nonsimulation games. Among the many definitions offered for nonsimulation games (the focus of the investigation reported in this article), the most useful appears to be "a game in an exercise of voluntary control systems, in which there is a contest between powers, confined by rules in order to produce a disequilibrial outcome" (Avedon and Sutton-Smith, 1971, p. 405).

Theoretical support for the use of games as a facilitator of learning can be drawn from a variety of sources, including the work of Dewey, Piaget, and Coleman. Dewey (Boocock and Schild, 1968) advocated the use of games as learning activities, and referred to them as essential learning tools. Piaget (Boocock and Schild, 1968) theorized that games play an essential part in the evolution of intelligence. Coleman (Livingston et al., 1973) places games in what he termed the "experiential mode" of learning and, where the advantages associated with that mode are desired, encouraged the use of games.

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Much of the effect of the research conducted to investigate the effectiveness of simulation and nonsimulation games has been inconclusive. Research findings suggest that the use of simulation games produces positive affective outcomes and that the use of nonsimulation games is most effective within a specific context, such as "Teams-Games-Tournaments (TGT)" (DeVries, Edwards, and Fennessey, 1973).

TGT is a carefully structured nonsimulation gaming process involving a sequence of teaching-learning activities designed to complement regular instruction. The TGT structure embodies both competition and cooperation in a way that promotes peer group rewards for academic achievement. TGT has been employed in studies in such areas as social studies, mathematics, and language arts and has been shown effective in improving cognitive learning.

Results from prior studies warrant additional research to explore the effectiveness of nonsimulation academic games used within the TGT gaming context. Findings from such research should assist teachers to develop curriculum materials and to select teaching techniques which are effective in helping students develop language arts skills.

METHOD

Design

To explore the relationship between the use of academic games in the TGT gaming system and the learning of capitalization and punctuation skills, an investigation (Lewis, 1975) was planned following a posttest only control group design (Campbell and Stanley in Gage (Ed.), 1963, p. 195). The hypotheses below summarizes those hypotheses which were investigated in the study:

H_1 As measured on the "Hoyum-Sanders English Test, Parts II and III, Capitalization and Punctuation", and the "Treatment Specific Test, Parts I and II, Capitalization and Punctuation", the mean score of the Gaming group and the mean score of the Combination group

on capitalization and punctuation are greater than the mean score of the Control group on capitalization and punctuation.

The independent variable in the design was teaching method. Three teaching methods were employed: (1) Control -- in which students were taught through conventional methods which included lectures, questions and answers, written and oral practice, and testing; (2) Gaming -- in which students were taught exclusively through gaming strategies using the "Teams-Games-Tournaments (TGT)" technique; and (3) Combination -- in which students were taught through a combination of conventional methods and gaming strategies, using TGT.

The dependent variable was classroom performance of students in the area of cognitive learning in two areas of language usage, capitalization and punctuation, as measured on the "Hoyum-Sanders Junior High School English Test--Grades VII-VIII, Test I, Form A, Parts II and III", and the "Treatment Specific Test, Parts I and II", a test designed by the investigator.

Subjects

The subjects in the investigation were 138 students assigned to six heterogeneous eighth-grade English classes at a junior high school in Frederick County, Maryland. Using a table of random numbers, these students were randomly reassigned by the investigator to create six different English classes, two of which were taught through gaming and two of which were taught through a combination of these methods. During the first week of the study, each of the three teachers who participated in the experiment was randomly assigned to one of the three classes which met in the morning. During the second and third week, each teacher moved to a new class, thereby teaching each of the three classes for a one-week period. The same procedure was followed for the three classes which met in the afternoon. This schedule illustrates the procedure:

Teacher I

1st Week - Control Group

2nd Week - Gaming Group

3rd Week - Combination Group

Teacher II

1st Week - Gaming Group

2nd Week - Combination Group

3rd Week - Control Group

Teacher III

1st Week - Combination Group

2nd Week - Control Group

3rd Week - Gaming Group

This schedule occurred twice, morning and afternoon, with a total of six classes and three teachers.

Instrumentation

Two measures of academic achievement were employed, the first a standardized test, the "Hoyum-Sanders Junior High School English Test--Grades VII-VIII, Test I, Form A, Parts II and III", and the second the investigator-design "Treatment Specific Test, Parts I and II".

Procedure

Three weeks prior to the investigation, an in-service session was scheduled for the teachers who were involved in the study. The in-service session, planned and conducted by the investigator, included the following topics:

1. The purpose and design of the study;
2. Instructional procedures to be followed for each of the three methods of teaching;
3. Instructional materials to be used for each of the three methods of teaching;

4. Techniques for record keeping;

5. Techniques for evaluation.

In-service sessions of this nature were continued throughout the study. Using a table of random numbers, all students from the six English classes were randomly assigned to the treatment groups, thereby creating six new groups. Groups met according to the following schedule:

Morning Schedule, Period 3 (10:14 to 11:00 A.M.)

Control Group (1 class)

Gaming Group (1 class)

Combination Group (1 class)

Afternoon Schedule, Period 7 (2:14 to 3:00 P.M.)

Control Group (1 class)

Gaming Group (1 class)

Combination Group (1 class)

The three participating teachers were randomly assigned to the groups, and rotated through the groups in the manner previously described. By rotating the teachers in this manner, each group was taught by each of the three teachers at some time during the experiment. Because all students were taught by all teachers, the threat to the internal validity of the study which may have resulted from superior or inept teaching was minimized.

On the first day of the 18-day experiment, students in all classes were told the purpose of the experiment, given a summary of the procedures to be followed, and told of the testing to be administered at the conclusion of the experiment.

Description of Instructional Procedures for Each of the Three Groups

Each of the three groups, Control, Gaming, and Combination, were taught in a different manner, using certain techniques and materials unique for that group. Instructional materials for all groups were provided by the investigator, and were chosen or developed after an analysis of several English language textbooks.

These instructional materials were chosen or developed on the basis of the common content from these texts.

The Control Group

Students in the Control Group were taught through conventional methods of teaching, which included lectures, questions and answers, written and oral practice, and testing. The standard procedure was for the teacher to introduce a rule(s) of capitalization or punctuation through a brief lecture. The lecture provided opportunity for student questioning, with the teacher frequently including in her answers examples which related to the rule(s) being studied. Following the lecture, students were given worksheets related to the instructional content. These worksheets were completed during the class session. An oral review was conducted by the teacher during which students corrected each others' papers. Concommittantly, questions which arose were answered by the teacher, using new examples where appropriate. At the end of approximately four days of instruction, students were asked to write on a topic of their own choice, or on a topic offered by the teacher.

Evaluation of the written composition was made exclusively on the basis of the capitalization and/or punctuation skills being taught. No other errors were noted by the teacher, unless requested by the student. Following the composition exercise, the student was given a quiz on the material taught, which was checked in class the next day through a student exchange of papers. Opportunity was provided for asking questions and resolving differences. At the end of the 14 days in which capitalization and punctuation skills were taught, new exercises were presented in the same manner as previously described. These exercises focused on the combined areas of capitalization and punctuation. This summary type of teaching was concluded with a test of capitalization and punctuation skills, which was graded by the teacher and returned to the students the following day.

Gaming Group

Prior to the first day of the experiment, students in these classes were rank ordered from highest to lowest on the basis of performance in their previous classes. They were then assigned to four-person teams so that each team consisted of one able player, two average players, and one less able player. These steps were followed in accordance with the procedures described by DeVries, Edwards, and Fennessey (1973, pp. 18-27). Students were provided with appropriate record-keeping forms and allowed to begin practicing the games for two days, abiding by the rules for play. On the third day, students were assigned to three-person tournament tables on the basis of their ability, so that each tournament table had students of comparable ability in competition. Students played the games as many times as the 46 minute class period would allow. At the end of play, high, middle, and low scores received an appropriate number of tournament points. These points determined at which tournament table the player would sit during the next session for tournament play, with high scorer moving upwards towards a higher-ranked table, low scorer down to a lower-ranked table, and middle scorer staying at the same table. The following day, students returned to team tables, where they were given a copy of the "Tournament Newsletter", which gave the results of tournament play, produced in accord with the practice recommended by DeVries, Edwards, and Fennessey (1973). While at the team tables, students were given new copies of appropriate games and asked to practice them in order to provide opportunity for peer tutoring of the target skills (p. 11). Following the practice at team tables, which lasted for either one or two class periods, students were returned to tournament tables, where the procedure for play was repeated. At the end of the experiment, teams and individuals with the greatest number of tournament points were awarded prizes. Those students whom teachers felt made the greatest improvement were also awarded prizes.

Combination Group

The Combination Group played TGT in the same manner as did the Gaming Group. However, prior to most sessions of team practice and tournament play, a brief lesson dealing with an appropriate skill to be mastered in team practice or tournament play was taught by the teacher. These lessons, which lasted from five to ten minutes, usually included a brief lecture concerning various capitalization and punctuation rules. They also included some examples of sentences involving these skills and questions and answers about these sentences occurring between teacher and students. Following these mini-lessons, team practice or tournament play was held. Because some time was required by the mini-lessons, there was a commensurate loss of time for team practice or tournament play. At the end of the experiment, prizes were awarded in the same manner as in the Gaming Group.

Posttesting Procedures

On the next-to-last day of the experiment, the two previously-cited instruments, the "Hoyum-Sanders" and the "Treatment Specific" tests were administered to all students in each of the six classes during a regular class period by the teachers.

All students and teachers participating in the study were asked to complete evaluation questions which had been developed by the investigator.

Analytical Strategy

The statistical procedure used to test the research hypotheses of this investigation was the univariate analysis of variance (ANOVA) (Dayton and Stunkard, 1971, pp. 152-168).

RESULTS

The findings of this investigation lead to the conclusion that within the limitations of the design and implementation procedures of the study, there is no significant differences among teaching methods in their effect on the cognitive learning of the language usage skills of capitalization and punctuation. Among the three teaching methods used in this study (the conventional techniques of lectures, question and answer, written and oral practice, and testing - the Control Group; gaming within the context of TGT - the Gaming Group; and a combination of the two techniques - the Combination Group), no one technique proved to be superior to another in enhancing achievement in capitalization and punctuation skills.

Table 1

Number of Subjects, Group Means, and Standard Deviations:
"Hoyum-Sanders English Test, Part II, Capitalization"

	N	Mean	S.D.
Gaming	45	11.69	1.28
Combination	44	11.96	1.90
Control	49	11.53	2.30

Table 2

Analysis of Variance Summary:
"Hoyum-Sanders English Test, Part II, Capitalization"

Source	df	MS	F	p
Treatment	2	2.11	.59	ns
Error	135	3.57		

Table 3

Number of Subjects, Group Means, and Standard Deviations:
"Hoyum-Sanders English Test, Part III, Punctuation"

	N	Mean	S.D.
Gaming	45	14.87	4.66
Combination	44	15.05	3.99
Control	49	15.29	4.41

Table 4

Analysis of Variance Summary
"Hoyum-Sanders English Test, Part III, Punctuation"

Source	df	MS	F	p
Treatment	2	2.08	.11	ns
Error	135	19.06		

Table 5

Number of Subjects, Group Means, and Standard Deviations:
"Treatment Specific Test, Part I, Capitalization"

	N	Mean	S.D.
Gaming	45	12.24	2.29
Combination	44	11.68	2.85
Control	49	11.37	2.57

Table 6

Analysis of Variance Summary:
"Treatment Specific Test, Part I, Capitalization"

Source	df	MS	F	p
Treatment	2	9.19	1.38	ns
Error	135	6.65		

Table 7

Number of Subjects, Group Means, and Standard Deviations
"Treatment Specific Test, Part II, Punctuation"

	N	Mean	S.D.
Gaming	45	9.80	2.38
Combination	44	9.68	1.97
Control	49	9.18	2.15

Table 8

Analysis of Variance Summary
"Treatment Specific Test, Part II, Punctuation"

Source	df	MS	F	p
Treatment	2	5.07	1.07	ns
Error	135	4.73		

DISCUSSION

The findings of this study do not coincide with most of the limited research which has been done in the area of nonsimulation games used within the context of TGT. The series of studies reported by DeVries (1974a) indicated that, in nearly every case, significant differences were found among the groups involved, with those groups employing TGT performing significantly better.

It is the opinion of the investigator that the most plausible explanation for the fact that significant results which favored gaming were not found in this investigation involves two aspects of the design of the games used in the study: the scope of game content and the rules for game play.

Taken together, the scope of capitalization and punctuation rules included in each game, and the requirement that students state the rules which corresponded to each item on the game cards, required a significant amount of class instructional time to manage appropriately. Additionally, the TGT system required students to learn and use a specific set of rules and procedures. Consequently, insufficient time may have remained for students to practice the capitalization and punctuation skills adequately.

A final consideration worthy of reemphasis is the fact that Control Group students had more class time to practice the capitalization and punctuation rules than did the Gaming Group or the Combination Group. This was true, because, since Control Group students were familiar with all the conventional procedures used with this group, no time was needed for them to learn unique procedures. However, a considerable amount of classroom time was used in the Gaming Group and Combination Group to learn the procedures necessary for TGT play. Therefore, what might have appeared to be equal practice time for all three groups was indeed unequal in favor of the Control Group.

The results of this study suggest implications for the theoritician, the teacher, and the researcher.

Theory

This investigation reveals no significant difference in student achievement in the language usage areas of capitalization and punctuation among groups of students taught with these different teaching methods. However, because the data suggest that the two methods which involved the use of nonsimulation games (Gaming and Combination) were as effective in teaching capitalization and punctuation skills as the method which did not involve the use of games (Control), the results of this study support further research efforts to extend and supplement existing theory.

Teaching

Among the implications for teaching, suggested by this and related studies, are the following: (1) TGT is a viable alternative to traditional teaching techniques, (2) TGT may be applied to virtually any content in the cognitive domain and can be used to present much of the information currently taught through traditional methods.

Research

The investigation described in this article raises many questions upon which further research might be designed. Among the issues which might be explored are (1) the scope and complexity of content included in the games, (2) the duration of play, (3) the age and grade levels of students, (4) the experience of teachers, (5) the intelligence levels and reading achievement levels of students, (6) the sex and racial composition of classes, and (7) attitudes of students.

Some of these issues have been addressed in current research conducted by the investigator. One such study investigated the use of games covering a wide range of language arts skills (capitalization, punctuation, abbreviations, types of sentences) with elementary grade students. Another study involving seventh grade students has explored the "reward" dimension of the TGT format. This study includes modification of the teaming procedures used in TGT, and the substitution of weekly quizzes for academic games.

A series of studies currently being planned will investigate the areas of the self concept and attitudes of students who are involved in classes using the TGT strategy. These studies will focus upon students in elementary and middle school grades.

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